

CLAIMS:

1. An IV catheter introducer comprising a tubular housing; a needle holder assembly having a tubular body slidably engaged inside the housing; a retraction mechanism seated in an annular space between the housing and the needle holder assembly; a plunger assembly having a plunger tube releasably engaged with the tubular body inside the housing; and a catheter attached by frictional engagement to the tubular housing; wherein

the tubular body comprises an outwardly facing annular recess proximal to the plunger tube;

the plunger tube comprises an outwardly extending annular boss proximal to the tubular body; and

the annular recess and annular boss are biased into releasable engagement.

2. The IV catheter introducer of claim 1 wherein the retraction mechanism is a spring.

3. The IV catheter introducer of claim 2 wherein the spring is a compressed spring.

4. The IV catheter introducer of claim 1 wherein the tubular housing and tubular body are made of clear plastic.

5. The IV catheter introducer of claim 4 wherein the clear plastic comprises polycarbonate.

6. The IV catheter introducer of claim 1 wherein the plunger tube has a vented end that is distal to the tubular body.

7. The IV catheter introducer of claim 6 wherein the vented end comprises a plastic end cap.

8. The IV catheter introducer of claim 7 wherein the plastic end cap is colored.

9. The IV catheter introducer of claim 6 wherein the vented end comprises an end cap having a vent hole and irregular surface features surrounding the vent hole.

10. The IV catheter introducer of claim 6 wherein the vented end comprises an end cap having an annular skirt that frictionally engages the plunger tube.

11. The IV catheter introducer of claim 6 wherein the vented end comprises a glued end cap.

12. The IV catheter introducer of claim 6 wherein the vented end comprises a sonically welded end cap.

13. The IV catheter introducer of claim 6 wherein the vented end comprises an end cap that is dual shot molded onto the plunger tube.

14. The IV catheter introducer of claim 4 wherein the needle holder assembly comprises a flash chamber with an interior space that is viewable through no more than two layers of clear plastic.

15. The IV catheter introducer of claim 1 wherein the needle holder assembly has an insert molded needle.

16. The IV catheter introducer of claim 1 wherein a needle is glued into needle holder assembly.

17. The IV catheter introducer of claim 1 wherein a needle is sonically welded into needle holder assembly.

18. The IV catheter introducer of claim 14 wherein the needle holder assembly has a needle with an end that extends into the flash chamber.

19. The IV catheter introducer of claim 1 wherein the tubular body has a plugged end comprising an inwardly facing annular recess in the tubular body and a porous plug inserted into frictional engagement with the annular recess.

20. The IV catheter introducer of claim 19 wherein the annular recess in the tubular body is adjacent to an outwardly tapered interior wall section of the tubular body.

21. The IV catheter introducer of claim 1 wherein the tubular body further comprises a reduced diameter section that is longitudinally spaced apart from the annular recess, and wherein the plunger tube is disengageable from the tubular body by an application of force to the plunger tube that is sufficient to slide the annular boss out of the annular recess and along the tubular body to a point opposite the reduced diameter section.

22. The IV catheter introducer of claim 21 wherein the needle holder assembly is forced into the plunger tube by the retraction mechanism when the annular boss is opposite the reduced diameter section.

23. The IV catheter introducer of claim 1 wherein the tubular housing comprises an open end and a plurality of laterally extending wings adjacent to the open end.

24. The IV catheter introducer of claim 1 wherein the catheter further comprises a cannula depending from a hub attachable to the tubular housing.

25. An IV catheter introducer comprising a tubular housing; a needle holder assembly having a tubular body slidably engaged inside the housing; a retraction mechanism seated in an annular space between the housing and the needle holder assembly; a plunger assembly having a plunger tube releasably engaged with the tubular body inside the housing; and a catheter attached by frictional engagement to the tubular housing; wherein

the plunger tube comprises a vented end that is opposite the tubular body.

26. The IV catheter introducer of claim 25 wherein the vented end comprises a plastic end cap.

27. The IV catheter introducer of claim 26 wherein the plastic end cap is colored.

28. The IV catheter introducer of claim 25 wherein the vented end comprises an end cap having a vent hole and irregular surface features surrounding the vent hole.

29. The IV catheter introducer of claim 25 wherein the vented end comprises an end cap having an annular skirt that frictionally engages the plunger tube.

30. The IV catheter introducer of claim 25 wherein the vented end comprises a glued end cap.

31. The IV catheter introducer of claim 25 wherein the vented end comprises a sonically welded end cap.

32. The IV catheter introducer of claim 25 wherein the vented end comprises an end cap that is dual shot molded onto the plunger tube.

33. The IV catheter introducer of claim 25 wherein the retraction mechanism is a spring.

34. The IV catheter introducer of claim 33 wherein the spring is a compressed spring.

35. The IV catheter introducer of claim 25 wherein the tubular housing and tubular body are made of clear plastic.

36. The IV catheter introducer of claim 35 wherein the clear plastic comprises polycarbonate.

37. The IV catheter introducer of claim 35 wherein the needle holder assembly comprises a flash chamber with an interior space that is viewable through no more than two layers of clear plastic.

38. The IV catheter introducer of claim 25 wherein the needle holder assembly has an insert molded needle.

39. The IV catheter introducer of claim 25 wherein a needle is glued into needle holder assembly.

40. The IV catheter introducer of claim 25 wherein a needle is sonically welded into needle holder assembly.

41. The IV catheter introducer of claim 37 wherein the needle holder assembly has a needle with an end that extends into the flash chamber.

42. The IV catheter introducer of claim 25 wherein the tubular body has a plugged end comprising an inwardly facing annular recess in the tubular body and a porous plug inserted into frictional engagement with the annular recess.

43. The IV catheter introducer of claim 42 wherein the annular recess in the tubular body is adjacent to an outwardly tapered interior wall section of the tubular body.

44. The IV catheter introducer of claim 25 wherein the tubular housing comprises an open end and a plurality of laterally extending wings adjacent to the open end.

45. The IV catheter introducer of claim 25 wherein the catheter further comprises a cannula depending from a hub attachable to the tubular housing.

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46. An IV catheter introducer comprising a needle holder assembly and a plunger assembly coaxially aligned and slidably engaged inside a tubular housing, a catheter releasably attached to the tubular housing, and a retraction mechanism biasing the needle holder assembly toward the plunger assembly, wherein:

the needle holder assembly comprises an elongated tubular body having a first end supporting a hollow needle with a beveled end, a second end containing a frictionally engaged porous plug, a flash chamber disposed between the first and second ends and in fluid communication with the hollow needle, and an outside wall having an annular recess disposed near the second end;

the plunger assembly comprises an elongated plunger tube having an open end that is slidably engaged over the second end of the tubular body of the needle holder assembly, a vented end opposite the open end, and engagement structure projecting radially inward near the open end;

the engagement structure being biased into engagement with the annular recess of the needle holder assembly with a force sufficient to prevent the needle holder assembly from being moved toward the plunger assembly by the retraction mechanism.

47. The IV catheter introducer of claim 46 wherein the tubular body further comprises a relief structure into which the engagement structure can be moved by manually overpressuring the biasing force of the engagement structure to disengage the engagement structure from the annular recess.

48. The IV catheter introducer of claim 46 wherein the engagement structure is an annular boss.

49. The IV catheter introducer of claim 46 wherein the plunger tube comprises a retraction cavity sufficiently large to receive at least a portion of the needle holder assembly therein during retraction of the needle to a position where the beveled end is inside the tubular housing.

50. The IV catheter introducer of claim 46 wherein the vented end of the plunger tube comprises a frictionally engaged vent cap.

51. The IV catheter introducer of claim 50 wherein the vent cap comprises a vent hole and surface relief structures surrounding the vent hole.

52. The IV catheter introducer of claim 46 wherein the vented end comprises a glued end cap.

53. The IV catheter introducer of claim 46 wherein the vented end comprises a sonically welded end cap.

54. The IV catheter introducer of claim 46 wherein the vented end comprises an end cap that is dual shot molded onto the plunger tube.

55. The IV catheter introducer of claim 46 wherein the tubular housing and the tubular body are made of clear plastic.

56. The IV catheter introducer of claim 46 wherein the retraction mechanism is a spring.

57. The IV catheter introducer of claim 56 wherein the spring is a compressed spring.

58. The IV catheter introducer of claim 46 wherein the catheter further comprises a cannula through which the hollow needle extends.



59. An IV catheter introducer comprising a tubular housing; a needle holder assembly having a tubular body slidably engaged inside the housing; a retraction mechanism seated in an annular space between the housing and the needle holder assembly; a plunger assembly having a plunger tube releasably engaged with the tubular body inside the housing; and a catheter attached by frictional engagement to the tubular housing; wherein

the tubular housing comprises an open end and a plurality of laterally extending wings adjacent to the open end.

60. An IV catheter introducer comprising a tubular housing; a needle holder assembly having a tubular body slidably engaged inside the housing; a retraction mechanism seated in an annular space between the housing and the needle holder assembly; a plunger assembly having a plunger tube releasably engaged with the tubular body inside the housing; and a catheter attached by frictional engagement to the tubular housing; wherein

the needle holder assembly comprises a flash chamber with an interior space that is viewable through no more than two layers of clear plastic.

61. An IV catheter introducer comprising:

a clear plastic tubular housing having a wide end, a narrow end, a stepped inside diameter between the wide and narrow ends, and laterally extending wings adjacent the wide end;

a needle holder assembly seated inside the housing, comprising a hollow needle with a beveled end, a needle support member holding the needle in coaxial alignment with the housing, a clear plastic flash chamber in fluid communication with the hollow needle, a porous plug sealing an end of the flash chamber opposite the hollow needle, and an annular recess facing radially outward near the sealed end of the flash chamber;

a plunger assembly further comprising a clear plastic plunger tube with an open end insertable into the housing around a portion of the needle holder assembly, a retraction cavity sufficiently large to accommodate withdrawal of the beveled end of the needle into the housing upon retraction, a first structure projecting radially outward to engage the housing, and a second structure projecting radially inward to engage the annular recess; and a vented end cap sealing the plunger tube opposite the open end;

a retraction mechanism compressed inside the housing around the needle support assembly and biasing the needle support assembly toward the retraction cavity of the plunger tube; and

a catheter frictionally engaging the narrow end of the housing and further comprising a cannula coaxially aligned with and slidably disposed over the hollow needle; wherein

the second structure engages the annular recess to prevent the needle support assembly from moving into the retraction cavity under the bias of the retraction mechanism and any additional force exerted upwardly on the needle during insertion of the cannula into a patient.

62. A method for assembling an IV catheter introducer comprising the steps of:

providing a tubular housing with a wide end, a narrow end and a stepped inside wall;

providing a needle support assembly comprising a tubular body holding a hollow needle in coaxial alignment with and in fluid communication with a substantially cylindrical flash chamber, the flash chamber being plugged at an end opposite the needle with a porous plug, the tubular body also having a spring guide section and an outwardly facing annular recess near the plugged end;

providing a coiled retraction spring slidably engageable with the spring guide section of the tubular body;

providing a plunger assembly comprising a plunger tube having an open end and a vented end, the plunger tube having an outwardly projecting structure and an inwardly projecting structure near the open end;

providing a catheter comprising a cannula and a tubular hub;

attaching the tubular IV hub to the narrow end of the housing;

inserting the coiled retraction spring into the wide end of the housing in coaxial alignment with the housing;

inserting the needle support assembly into the wide end of the housing in coaxial alignment with the housing, causing the needle to slide downwardly through the retraction spring and the cannula until the tubular body is seated inside the housing and the retraction spring is disposed around the spring guide;

inserting the plunger tube into the wide end of the housing in coaxial alignment with the housing and with the needle support assembly, and causing the open end of the plunger tube to override the plugged end of the needle holder assembly until the outwardly projecting structure engages the stepped inside wall of the housing and the inwardly projecting structure engages the annular recess, thereby compressing the retraction spring and maintaining the retraction spring in its compressed state by the engagement between the inwardly projecting structure and the annular recess.

63. The method of claim 62 wherein the retraction spring is placed over the needle support assembly before the needle support assembly is inserted into the wide end of the housing.

64. The method of claim 62 wherein the plunger tube is engaged with the needle support assembly before the needle support assembly is inserted into the wide end of the housing.

65. The method of claim 62 wherein the needle support assembly is first provided without a needle, and the needle is later glued into the needle support assembly following insertion of the needle support assembly into the housing.

66. The method of claim 62 wherein the needle support assembly is first provided without a needle, and the needle is later sonically welded into the needle support assembly following insertion of the needle support assembly into the housing.